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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/295,607	04/22/1999	SHUNPEI YAMAZAKI	740756-1961	7371
22204	7590	09/26/2007		
NIXON PEABODY, LLP 401 9TH STREET, NW SUITE 900 WASHINGTON, DC 20004-2128			EXAMINER HU, SHOUXIANG	
			ART UNIT 2811	PAPER NUMBER
			MAIL DATE 09/26/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/295,607	YAMAZAKI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Shouxiang Hu	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 3, 7, 8, 11, 12, 15-17, 20-35 and 37-65 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 3, 7-8, 11-12, 15-17, 20-35 and 37-65 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 08/085,931.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11, 15, 25, 31, 33, 37, 43, 45 and 48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of these dependent claims depends on a corresponding independent claim 2, 6 or 19. However, each of these independent claims has been canceled; and, it is not clear what and/or how limitations in these canceled independent claims are necessarily incorporated into these depended claims.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

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be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 3, 7, 11, 12, 16, 22, 28, 31, 32, 34, 40, 43, 44, 46, 51, 54-56 and 60-65 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-27 of U.S. Patent No. 6,268,631. Although the conflicting claims are not identical, they are not patentably distinct from each other because they each claim the substantially same subject matters of a semiconductor device comprising:

- a substrate having a front surface and a rear surface;

- an aluminum nitride insulating film containing therein oxygen provided under the rear surface and/or on the front surface of the substrate; and

- a transistor provided over the front surface of the substrate, the transistor having at least a channel formation region comprising crystalline silicon, a gate insulating film adjacent to the channel formation region, and a gate electrode adjacent to the channel formation region with the gate insulating film interposed therebetween.

Although the patented claims (1-27 in US Patent No. 6,268,631) does not explicitly recite that the aluminum to nitrogen ratio in the aluminum nitride insulating film is in the range of 0.9 to 1.4, it is art known that an aluminum nitride insulating film commonly has a chemical formula of AlN (as further evidenced/disclosed in the same patent, 6,268,631, see col. 5, line 14), which has an Al-to-N ratio of about 1. And, the

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exact Al-to-N ratio in the aluminum nitride insulating film is an art-recognized parameter of importance subject to routine experimentation and optimization.

Therefore, it would have been well within the ordinary skill in the art at the time the invention was made to make the invention as defined in the patented claims with the Al-to-N ratio being substantially about 1, so as to achieve the desired and/or optimized quality for the aluminum nitride insulating film, since it has been held that:

"[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 7-8, 11-12, 15-17, 20-35 and 37-65 are rejected under 35 U.S.C.

103(a) as being unpatentable over Ikeda (Ikeda et al., JP 59-121876; of record) in view of Kim (Kim et al., US 5,270,263).

Ikeda discloses a semiconductor device (similar to Figs. 1a-1c; also see its English translation, especially see the second paragraph on page 4 in the translation), comprising:

a substrate (11; glass) having a front surface and a rear surface;

an aluminum nitride insulating film (12, which can be formed of AlN, see the second paragraph on page 4 in the translation; about 0.5  $\mu\text{m}$  thick) provided under the rear surface and/or on the front surface of the substrate, wherein Ikeda expressly disclose that the aluminum nitride insulating film has a chemical formula of AlN (see the second paragraph on page 4 in the translation), which naturally has an Al-to-N ratio of 1 (i.e., it naturally meets the recited ratio within the range of 0.9 to 1.4); and,

a transistor provided over the front surface of the substrate, the transistor having at least a channel formation region comprising silicon (similar to 15a and/or 15b; it can be a crystalline silicon as it can be formed of polysilicon, see the second paragraph on page 4 in the translation), a gate insulating film (14) adjacent to the channel formation region, and a gate electrode (13 a and/or 13b) adjacent to the channel formation region with the gate insulating film interposed therebetween.

Ikeda further teaches that the aluminum nitride insulating film can be formed through sputtering.

Ikeda does not expressly disclose sufficient details about the sputtering process for forming the aluminum nitride insulating film, and/or that such insulating film through sputtering includes oxygen and/or carbon.

However, as evidenced in Kim (see the abstract, col. 1, lines 25-35, col. 3, lines 3-10, and col. 5, lines 38-39; also see Fig. 5), one of ordinary skill in the art would readily recognize that an aluminum nitride insulating film (AlN, which also has an Al-to-N ratio of 1; having a thermal conductivity of about 1.5 W/cm K) can be commonly and desirably formed through sputtering with a nitrogen gas being used as both the reactive gas and

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the sputtering gas for achieving desired high quality for the insulating film; and, the aluminum nitride insulating film formed through such sputtering process naturally contains (more or less) certain oxygen and/or carbon (see col. 5, lines 38-39; also see the naturally existing O and/or C in Fig. 5), as either of O and C is one of the nature's most abundant elements and it is normally unpractical to completely remove it from such a sputtering system.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the semiconductor device of Ikeda with the aluminum nitride insulating film be formed through a nitrogen gas-based sputtering method, per the teachings of Kim, so that a semiconductor device with desired high quality in the aluminum nitride insulating film therein would be obtained. And, with the aluminum nitride insulating film being formed through the nitrogen gas-based sputtering method of Kim, the aluminum nitride insulating film in the semiconductor device collectively taught above by Ikeda and Kim would inherently and/or naturally include certain oxygen and/or carbon therein.

Regarding claims 43-53, 55 and 58, it is noted that the limitations recited in these claims regarding how the recited channel formation region is crystallized are process limitations. And, these would not carry patentable weight in the claims drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claims 54-65, it is noted that: it is well known in the art (as readily evidenced in the prior art such as US 5,032,883 to Wakai et al.; see the cover page

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figure) that a thin film transistor can be desirably covered by an interlayer insulating film (108) having a leveled upper surface underlying a pixel electrode (110), so as to form a display device with a desired substantially flat pixel electrode and/or with a desired passivation for the transistor and/or desired electrical stability for the device.

### ***Response to Arguments***

Applicant's arguments filed on July 25, 2007 have been fully considered but they are not persuasive; and responses to them have been fully incorporated into the claim rejections set forth above in this office action.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Friday, 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



SH

September 17, 2007

SHOUXIANG HU  
PRIMARY EXAMINER